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College of Science and Mathematics Annual Report 2007

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Opening Minds to Science

2007 Annual Report

Message from the Dean

I am pleased to bring you the College of Science and Mathematics 2007 annual report. It documents the first full year of our five-year strategic plan called ***Opening Minds to Science,*** which was implemented in the fall of 2006. *Opening Minds to Scien*ce is an ambitious plan that was developed during the 2006-07 academic year through the collaborative efforts of our departmental chairs, program directors, faculty, staff, and advisory board to identify and establish ways to position the College of Science and Mathematics at Wright State University as a pioneer in the frontiers of science, technology, engineering, and mathematics (STEM).

We are well aware that STEM has become the focus of many national, regional and local imperatives to develop new programs that will strengthen the math and science skills of today's learners so they can become tomorrow's innovators. We must also develop a STEM-capable workforce so that the United States can win back its competitive edge in high technology and drive successfully toward a global economy.

One vital way to do this is to fuel basic research. As a result, the College of Science and Mathematics (CoSM) has proudly staked claim to serving our university, our community, our region, and our nation as an intentional and active partner in growing the knowledge economy. We are accomplishing our mission by improving and expanding constituencies critical to STEM education through core strategies that target our four constituencies: 1) the research community, including graduate education; 2) STEM educators at all levels (grades P-20); 3) undergraduates; and 4) alumni.

CoSM intends to achieve its mission through seven core strategies:

A. Enhance core capabilities for a research platform
B. Expand interdisciplinary capabilities to solve complex world problems
C. Strengthen graduate education
D. Position the college as a regional research and education partner of choice
E. Exercise national leadership in the science of teaching and learning
F. Continue to improve undergraduate student success
G. Develop and expand relationships with our alumni

In this annual report, we show the advancements we have made during this first year of *Opening Minds to Science*.

Sincerely,

Michele G. Wheatly

A. Enhance Core Capabilities for a Research Platform

In positioning Wright State University (WSU) as a nationally competitive research institution, we are strengthening our core capabilities to develop a research platform that allows us to showcase our facilities, equipment, technical support, and human intellectual capital.

HIGHLIGHTS:

- Large construction and renovation projects continued in 2007. The renovated Brehm Lab building provides the Department of Earth and Environmental Sciences with consolidated research space on the second floor. It contains state-of-the-art teaching labs for Chemistry in the basement and specially designed teaching labs for science education on the first floor.
- The Matthew O. Diggs III Laboratory for Life Science Research became the new home for life science researchers. This LEED-certified GOLD laboratory building is one of the first in the region to qualify for this status based on sustainability (or Green) design. Diggs Lab, as it is now called, houses the Department of Biochemistry and Molecular Biology and researchers with similar interests from the Department of Biological Sciences
- $6 million of new computing equipment and proprietary software for research to reduce the time in processing and interpreting large volumes of seismic data was received from oilfield services giant Schlumberger, Ltd.

- John Stireman, Assistant Professor in Biology, received the President's Award for Early Career Achievement.
- Cheryl Conley moved from across town at Orchid Gene Screen to direct our Clinical Laboratory Sciences program. Dr. Conley was one of the first Biomedical Sciences (BMS) PhD graduates.
- Francisco Alvarez was named WSU Trustees Award for Faculty Excellence
- Julian Gomez-Cambronero received an Academy of Medicine Award for Outstanding Senior Faculty

The hiring of new faculty enhanced several departments and programs. New additions include:

Weifu Fang – Mathematics & Statistics (M&S)
Weifu Fang became Chair of the Mathematics and Statistics department in 2007. He earned his Ph.D. from Claremont Graduate University. His research interests include applied mathematics, partial differential equations, and inverse problems.

Tim Boester – M&S
Tim Boester received his PhD in Educational Psychology from the University of Wisconsin, and came to Wright State University in 2007 as an Assistant Professor in a joint appointment between M&S and the Department of Teacher Education. His research interests are in the area of mathematics teacher education.

Christopher Wyatt – Neuroscience, Cell Biology and Physiology (NCBP)
Christopher Wyatt received his PhD in the Department of Pharmacology, University of Leeds, United Kingdom in 1994. He joined NCBP as an Assistant Professor January 1, 2007. He studies the cellular mechanisms of oxygen sensing, including the energy-sensing enzyme AMP-activated protein kinase that is critical in the transduction of hypoxic-signaling by the carotid body.

Ashot Kozak – NCBP
Ashot Kozak received his PhD in Biomedical Sciences from Mount Sinai School of Medicine, C.U.N.Y. He joined NCBP as an Assistant Professor late in 2007. His research concerns ion transport pathways in T lymphocytes, calcium signaling, and cation channels.

Jason Deibel – Physics (PHY)
Jason Deibel joined the Department of Physics as an Assistant Professor in 2007. He completed his PhD at University of Michigan in Applied Physics. Jason was an Intelligence Community Postdoctoral Fellow at Rice University. Dr. Deibel conducts research in terahertz spectroscopy and imaging, with a focus on development of terahertz antennas and waveguides.

Melissa (Missy) Schen – Biology (BIO)
Melissa (Missy) Schen received her PhD from the Ohio State University specializing in Science Education. She joined the Department of Biological Sciences as an Assistant Professor in 2007. She has a dual appointment with the College of Education. Her research looks at scientific reasoning skills in undergraduate college students.

Chad Hammerschmidt – Earth and Environmental Sciences (EES)
Chad Hammerschmidt earned a Ph.D. in oceanography from the University of Connecticut in 2005, and was a Postdoctoral Scholar at the Woods Hole Oceanographic Institution prior to joining Wright State University as an Assistant Professor in September 2007. His research is focused on developing a quantitative understanding of processes that affect the fate of mercury and other trace metals in the environment. He examines the biogeochemistry of mercury in arctic and temperate watersheds, marine systems (coastal and open ocean), and the atmosphere.

Full-Time Faculty		Opening Minds to Science				
	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011
Professors	45.6	46.7				
Associate Professors	49.5	50.0				
Assistant Professors	23.0	20.5				
Instructors and Lecturers	17.0	23.0				
Total Faculty	135.0	140.0				

Research Funding		Opening Minds to Science				
	2006	2007	2008	2009	2010	2011
Grants funded	136	139				
Dollars awarded (millions)	8.6	9.2				

Research Funding (Matrix Depts.)		Opening Minds to Science				
	2006	2007	2008	2009	2010	2011
Grants funded	27	27				
Dollars awarded (millions)	3.7	4.2				

Scholarly Activities		Opening Minds to Science				
	2006	2007	2008	2009	2010	2011
Publications (Refereed Articles and Book Chapters)	212	196				
Presentations and invited talks	321	324				
Editorial Board Membership	26	28				

B. Expand Interdisciplinary Capabilities to Solve Complex World Problems

As our world becomes increasingly complex, its problems will require solutions that involve interdisciplinary teams with innovative approaches. The three PhD programs in CoSM each have an interdisciplinary base that draws on faculty in many departments. Another example of using an interdisciplinary approach concerns the college's role in emergency preparedness. Natural disasters and large-scale human tragedies have brought emergency preparedness to the forefront of our thinking.

CoSM is an active research partner on a university-led community initiative called Calamityville™, led by WSU's Homeland Emergency Learning and Preparedness (HELP) Center. CoSM's role has been to provide research expertise and support in the areas of human effectiveness and sensors technology. Faculty researchers in psychology study the effectiveness of humans, from the training and coordination of emergency teams to developing the technology to train responders more effectively and from evaluating human performance while under stress to identifying factors that affect decision-making. Physics researchers explore ways to use sensor, Internet, and command-and-control technologies to improve communications and visualization information for decision makers and emergency responders. In biomedical sciences, faculty members research the use of biometrics to identify different levels of human injuries, as well as casualties.

HIGHLIGHTS:

- Faculty members made over 300 presentations, including invited lectures.
- College faculty and staff members organized over 80 special events (conferences, seminars, and colloquiums).
- Hunt Brown has a joint appointment as Senior Lecturer in the Department of Earth and Environmental Science and as Director of Sustainability in the Office of the Provost.
- Wright State's Comprehensive Neuroscience Center (CNC) opened in February 2007 as an expansion on the scope and mission of the former Center for Brain Research. It integrates teams of scientists and clinicians across numerous disciplines to collaboratively address fundamental issues in both basic science and clinical neuroscience research.
- In October 2007, the CNC received a prestigious Program Project Grant from the National Institute of Neurological Disorders and Stroke. The $4.8 million grant is the first Program Project Grant the university has received. Five university scientists associated with the Comprehensive Neuroscience Center (Drs. Francisco Alvarez, Timothy Cope, Kathrin Engisch, Robert Fyffe and Mark Rich) will use the grant to further their research into why full recovery is not always achieved after damaged nerves have regenerated.

C. Strengthen Graduate Education

This Core Strategy is to strengthen graduate education in CoSM through growth in doctoral programs and recruitment of top faculty, and outstanding students. The college has three interdisciplinary PhD programs in addition to eleven MS degree programs. The relatively young ES PhD program has just begun graduating new young scientists.

HIGHLIGHTS:

- The BMS Program completed a new promotional DVD. It advertises the reorganized structure of the program as well as the MD/PhD. dual degree program and the interdisciplinary Learning with Disabilities Program.

- Thirteen "regular" PhD students entered the BMS PhD program in the fall of 2007, and three MD/PhD students entered. One minority student (black) entered the Program this year. The average GPA was 3.32 and GRE scores averaged Verbal 470, Quantitative 670 and Analytical 4.5.

- The BMS program graduated five in 2007, bringing their total number of graduates to 157.

- Christina Powell was awarded the 2007 EPA GRO Fellowship from the U.S. Environmental Protection Agency's Greater Research Opportunities (GRO) Program. Christina's fellowship was the third award to be received by Wright State students in two consecutive years.

- ES PhD students were authors or co-authors on approximately 35 presentations at meetings and on 8 papers during 2006/2007.

- Larry Ream was named the Robert J. Kegerreis Distinguished Professor of Teaching

- Robert Putnam received the Wright State University Boonshoft School of Medicine Faculty Mentor Award, 2007

- Barbara Kraszpulska joined NCBP as an Assistant Professor specializing in Medical and graduate education. She received her PhD in Anthropology from the University of Physical Education in Gdansk, Poland. Barbara is Director of Human Gross Anatomy and assists with the laboratory portion of the Human Structure course taken by 1st year medical students.

Enrollment in M.S. and M.S.T. Programs		**Opening Minds to Science**				
	Fall 2006	**Fall 2007**	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**
Biochemistry & Molecular Biology, M.S.	10	10				
Biological Sciences, M.S.	43	37				
Chemistry, M.S.	34	26				
Earth & Environmental Science, M.S.	24	24				
Mathematics & Statistics, M.S.	24	31				
Microbiology & Immunology, M.S.	11	14				
Neuroscience, Cell Biology & Physiology, M.S.	36	44				
Physics, M.S.	18	10				
Psychology, M.S.	7	5				
Earth Science, M.S.T.	11	16				
Interdisciplinary Science & Math, M.S.T.	20	5				
Total	**238**	**222**				

Degrees Awarded, M.S./M.S.T.		Opening Minds to Science				
	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Biochemistry & Molecular Biology, M.S.	1	4				
Biological Sciences, M.S.	12	7				
Chemistry, M.S.	11	10				
Earth & Environmental Science, M.S.	10	6				
Mathematics & Statistics, M.S.	9	7				
Microbiology & Immunology, M.S.	4	4				
Neuroscience, Cell Biology & Physiology, M.S.	3	12				
Physics, M.S.	6	4				
Psychology, M.S.	7	4				
Earth Science, M.S.T.	5	5				
Interdisciplinary Science & Math, M.S.T.	3	6				
Total Degrees Awarded	**71**	**69**				

Enrollment, Ph.D. Programs		Opening Minds to Science				
	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011
Biomedical Sciences	46	53				
Environmental Sciences	20	21				
Psychology (HF/IO)	47	49				
Total	**113**	**123**				

Degrees Awarded, Ph.D.		Opening Minds to Science				
	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011
Biomedical Sciences	4	3				
Environmental Sciences	–	2				
Psychology (HF/IO)	3	4				
Total	**7**	**9**				

D. Position CoSM as a Regional Research and Educational Partner of Choice

In 2007, the College established a stronger presence in the community and region by participating in various applied educational- and research-based economic initiatives supported by Wright-Patterson Air Force Base (WPAFB), the Air Force Research Laboratory (AFRL), industry, medicine, and the local economic development community. CoSM also partnered with other area institutions of higher education to develop regional educational planning as well as a regional research platform.

HIGHLIGHTS:

- "Exploring Human Anatomy: An Interactive Anatomy Lab Experience". This hands-on Anatomy Lab experience provides a great opportunity for students to further their understanding of human anatomy. Students are presented with an overview of the structure and function of the major organ systems of the body using healthy and diseased organs. Presentations were made by **D. Miska** to over 800 high school and technical college students.
- EMS Cadaver Anatomy Procedure Lab – Gross anatomy instruction was coupled with training in field emergency procedures to train ~150 area EMS personnel. **G. Nieder** was involved in organizing the anatomy lab portion.
- Horizons in Medicine – This program offers local high school students, mostly from disadvantaged or minority backgrounds, the opportunity to see first hand the science and delivery of health care that forms the foundation of a career in medicine. **G. Nieder** directed the instruction of 20 HS students for the one week anatomy segment
- The Chemistry Demonstration Program, led by Professors *Emeriti* **Rubin Battino** and **John Fortman,** with the assistance of **Kirby Underwood** (Freshman Lab Manager), students, and staff, reaches roughly 7500-8000 high school, junior high, and grade school students each year with multiple presentations in December and March. *It is, so far as we can determine, the largest chemistry outreach program in the nation* (and possibly the world). Students are shown demonstrations of exciting chemical phenomena, with a lively dialog of information and humor.
- Organized an international conference, "*Physics-Based Mathematical Models of Low- Dimensional Semiconductor Nanostructures: Analysis and Computation,*" (Banff International Research Station, Nov 18-23, 2007).

E. Exercise National Leadership in the Science of Teaching and Learning

The Core Strategy is to exercise national leadership in the science of teaching and learning, responding to society's need for mathematics and science literacy and a globally competitive workforce.

HIGHLIGHTS:

Faculty members from Biological Sciences, Physics, and Mathematics and Statistics served as instructors and advisors for the West Ohio Center for Excellence in Science and Mathematics Education (WeEXCEL), a collaborative partnership involving Wright State University, other local academic institutions, K–12 school systems, and regional organizations to strengthen the region's capacity to continually improve science and math teacher preparation, as well as K–20 science and mathematics education.

F. Improve Undergraduate Student Success

The Core Strategy is to strengthen the undergraduate student success through general education, student-centered faculty, research opportunities, the advising process, student-support programming, and the recruitment of top undergraduate students.

HIGHLIGHTS:

- STEM Talent Enhancement Program (STEP) Debuts New Course: SM101
- Roger Fecher (Biology) received the Barry M. Goldwater Scholarship Award
- Dorothy Carter (Psychology) received the Psi Chi Regional (Midwestern) Research Award and the Women in Science Giving Circle Educational Scholarship Award, $1,500
- Brittany Henry (Biological Sciences), received the Women in Science Giving Circle Educational Scholarship Award, $1,500
- Biology Honors students stage an on-campus symposium on the importance of sustainability after taking "Working Towards Sustainability," a new course developed by Hunt Brown (Earth and Environmental Sciences). The students visited the Lower Ninth Ward of New Orleans to repair homes that were damaged by Hurricane Katrina and returned to campus pledging to do more for the environment.
- Nick Ritucci joined NCBP as an Instructor, where he is co-director of the undergraduate Anatomy and Physiology courses and also teaches in three Biennium I and II medical school courses. Nick received his PhD in the BMS Program at Wright State, working in Dr. Robert Putnam's lab.
- Michael Bourne earned an M.S. in Geology from Bowling Green State University in 2006 and joined the EES department as an Instructor in 2007. His thesis focused on using remote sensing data to map the effects of nonpoint source pollution on cyanobacterial blooms in Lake Erie.
- David Schmidt is the current *Director of Undergraduate Programs* in EES. David received his Ph.D. in Paleontology from Ohio State University (Earth Sciences). His research has focused on the role of carbonate-forming microbial communities in the formation of sedimentary rocks.

Undergraduate Enrollment By Program		**Opening Minds to Science**				
	Fall 2006	**Fall 2007**	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**
Biological Sciences	641	641				
Chemistry	142	113				
Clinical Laboratory Science	40	36				
Earth Science	31	36				
Environmental Science	37	35				
Integrated Science	15	10				
Mathematics	81	73				
Physics	31	22				
Psychology	644	679				
Undeclared Science & Mathematics	126	137				
Total Enrollment	**1788**	**1782**				

Undergraduate Degrees Awarded by Program		**Opening Minds to Science**				
	2006-07	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**
Biological Sciences	92	105				
Chemistry	31	22				
Clinical Laboratory Science	4	6				
Earth Science	8	7				
Environmental Science	7	3				
Integrated Science	1	1				
Mathematics	22	17				
Physics	5	4				
Psychology	139	170				
Undeclared Science & Mathematics	NA	NA				
Total Degrees Awarded	**309**	**335**				

Undergraduate Degrees Awarded by Degree, Gender, and Ethnicity		Opening Minds to Science				
	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011
BS	117	141				
BA	192	194				
Female	189	212				
Male	120	123				
American Indian/Alaskan Native	1	0				
Asian/Pacific Islander	14	15				
Black/Non-Hispanic	22	31				
Foreign/Non-Resident Alien	1	6				
Hispanic	4	5				
Unknown	26	24				
White	241	254				

G. Develop and Expand Alumni Relations

This Core Strategy aims to develop and expand relationships with our CoSM alumni to engage them as partners in our mission. The college has awarded over 8,500 undergraduate and graduate degrees and many of these alumni remain in the region. Our goal is to become reacquainted with more of them, facilitating active partnerships in "Opening Minds to Science" through sharing their success and affording business/research opportunities to the CoSM STEM graduates of tomorrow.

2007 College of Science and Mathematics Outstanding Alumni Award Recipient

Michael W. Zebrowski, B.S. '75, manager of geoscience development for Amerada Hess Corporation in Houston, is the College Outstanding Alumni Award winner from the College of Science and Mathematics. The first student to graduate from the Department of Geological Sciences Geophysics option, Zebrowski worked as a student employee in the university's Physical Plant while attending Wright State. He helped in drafting campus buildings and worked to survey portions of the campus topography to assist with ongoing construction.

While at Amerada Hess, Zebrowski has played an innovative role as both a geologist and geophysicist in the global search for energy. He has contributed to a number of significant oil and gas field discoveries.

Over the years, Zebrowski has been instrumental in obtaining scholarship grants from the Hess Foundation for Wright State. He has helped WSU obtain equipment and software and is currently developing a collaborative effort between Garyounis University in Libya, Wright State, and Hess on several projects with Hess's Libyan concessions.

A member of the Society of Exploration Geophysicists and Denver Geophysical Society, Zebrowski has presented at numerous universities and professional conferences. He serves on the advisory board of Knowledge Systems Incorporated, which provides technical services to the energy and drilling industries.